FOREST PEST MANAGEMENT

BIOLOGICAL EVALUATION

R2-86-1

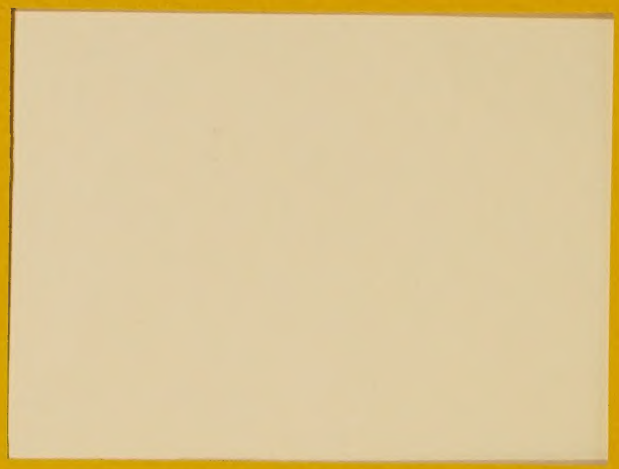
Fusarium acuminatum and a
Tip Blight of Russian Olive

1986

United States
Department of
Agriculture

Forest Service

Forest Pest Management
Denver, Colorado



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INTRODUCTION

Russian olive (Elaeagnus angustifolia L.) at Big Sioux Nursery, Watertown, South Dakota, has been suffering from a tip blight of unknown etiology for the past few years. In 1985, the blight resulted in 50 percent cull of the 1-0 Russian olive seedlings. The tip blight was characterized by blackening and necrosis of shoot tips and stems, sometimes accompanied by leaf blotching. Symptoms usually appeared in late July and intensified until mid to late September. By the beginning of the second growing season, 1-0 stock exhibited increased disease incidence and decreased growth. Since the appearance of the tip blight problem, Russian olive is lifted as 1-0 stock at Big Sioux.

Blighted samples sent to USDA Forest Pest Management (FPM R-2) in Lakewood, Colorado, yielded species of Alternaria, bacteria, Ascochyta, and Fusarium. None of these isolates were maintained in culture. USDA FPM R-1 in Missoula, Montana, also isolated Alternaria sp. and a Fusarium sp. tentatively identified as F. avenaceum (Fr.) Sacc. from blighted tissue (James et al., 1985), and kept the Fusarium isolate (85-93) in culture.

In Spring 1986, Richard Dorset, South Dakota Forest Pest Specialist, requested a pathogenicity study with the Fusarium isolate tested against Big Sioux Russian olive. FPM R-2, obtained seed from Blaine Martian Big Sioux Nursery Manager, and the Fusarium isolate 85-93 from FPM R-1. The Fusarium isolate 85-93 was in fact Fusarium acuminatum Ell. and Ev. sensu Gordon, because of the presence of chlamydospores (Figure 1).

MATERIALS AND METHODS

Seedlings

Russian olive seed from the susceptible seedlot was stratified in moist sand at 4°C for 75 days (Olson, 1974). At least 90 seeds were sown in each of four 28 x 53 cm flats, 1.3 cm deep in 1:1 peat/vermiculite potting mix. Two flats were placed in each of two growth chambers at 30°C days and 20°C nights with 16 hours light and 8 hours dark (Olson, 1974). A thin covering of perlite helped reduce mud splatter when watering and helped keep the soil cool. Flats were watered every three to four days. Forty-five days after sowing, half of the seedlings in each flat were top-pruned to 6 cm. Seedlings shorter than 6 cm tall were pruned by removal of their apical meristem. One growth chamber was reserved for inoculation with F. acuminatum and the other was a control. Each chamber contained at least 105 seedlings.

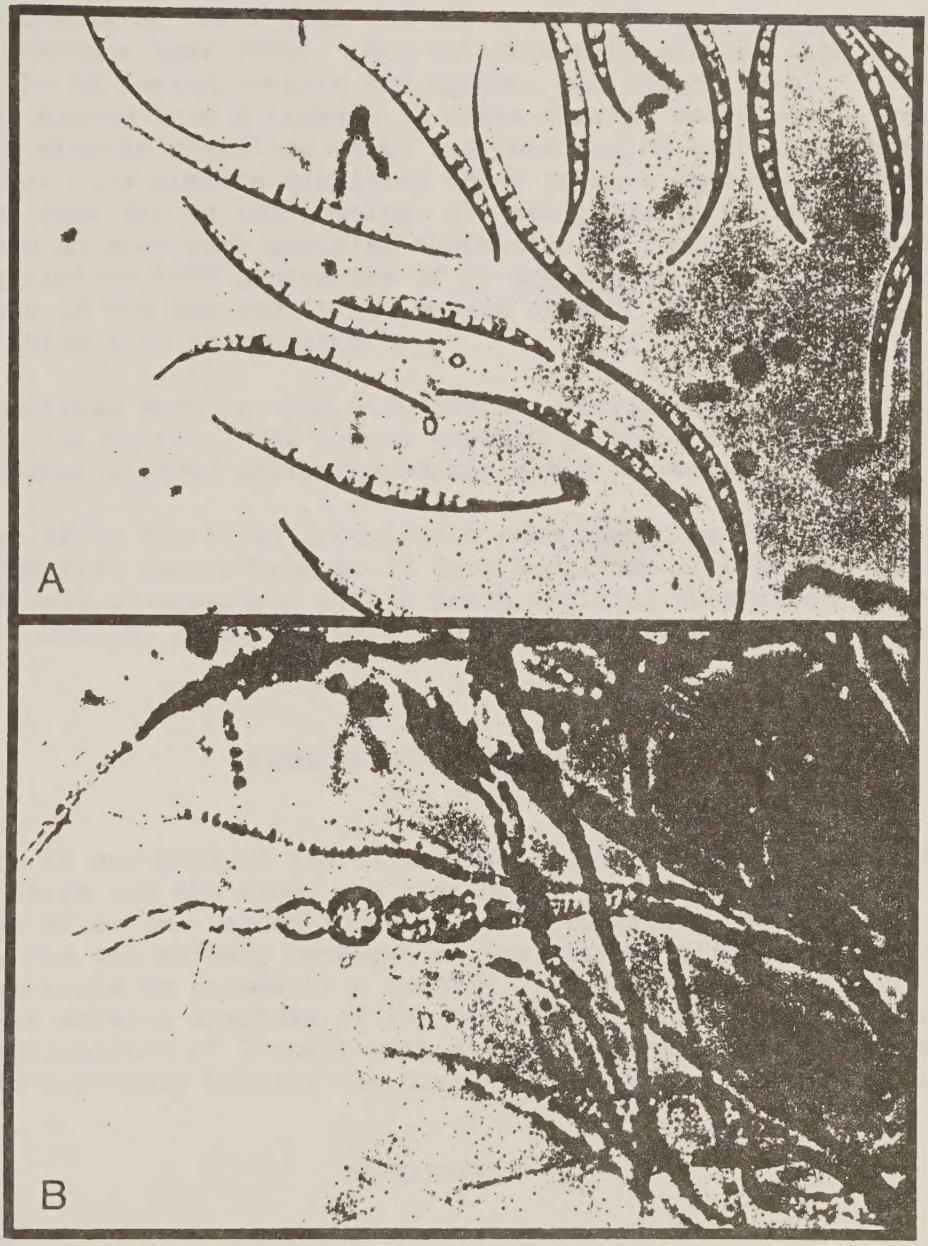
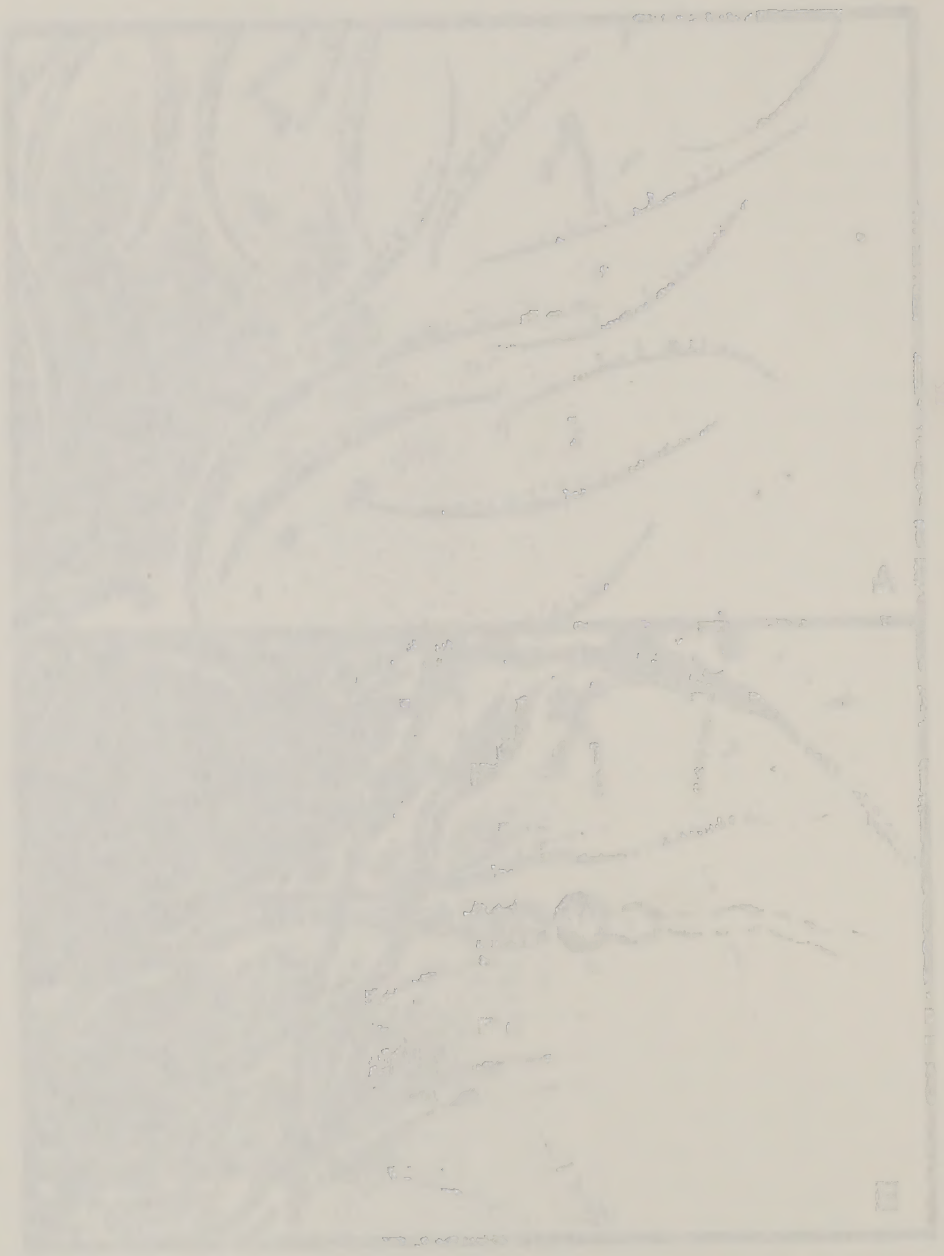


Figure 1. A. Macroconidia in water (500 power) from 1 week old culture of Fusarium acuminatum (FPM-R-1 isolate 85-93) on carnation leaf agar (CLA).

B. Chain of chlamydospores in situ (500 power) in 1 week old culture of F.acuminatum (FPM R-1 isolate 85-93) on CLA.



Fusarium Inoculation

A few milliliters (ml) of sterile distilled water were poured onto each of seven one-week or three-week-old cultures of F. acuminatum growing on potato dextrose agar (PDA). Wet cultures were scraped with a sterile knife to loosen conidia and hyphae, and the conidial suspensions poured into a beaker. A clean plastic spray bottle was rinsed with sterile distilled water and then filled with the contents of the beaker plus sterile distilled water to make approximately 250 ml. On the same day as top-pruning, all seedlings in the inoculation chamber were sprayed with conidial suspension to runoff. The conidial suspension yielded 5480 propagules of F. acuminatum per 1 ml of spray. Petri plates of PDA exposed in the growth chamber during spraying yielded a thick felt of mycelium.

Control seedlings were sprayed with sterile distilled water from a different spray bottle. PDA plates exposed in the control chamber during spraying yielded scattered bacteria and saprophytic fungi.

Thirty days after the first inoculation, the seedlings in the unpruned half of each flat were pruned to 13 cm. Seedlings previously inoculated were also sprayed with a fresh conidial suspension prepared as before. Control seedlings were again sprayed with sterile water as before.

RESULTS AND DISCUSSION

No evidence of any kind of tip blight was found on any of the Russian olive seedlings and the study was terminated 92 days after sowing, three weeks after the second inoculation. Fusarium acuminatum is apparently not the primary pathogen in the Russian olive tip blight. The disease could be caused by a complex. Several Russian olive seedlots are showing symptoms of the tip blight at Big Sioux Nursery. Regular applications of Benomyl with a few applications of Bordeaux mixture are currently keeping the disease under control at the Nursery.

REFERENCES

Olson, David F., Jr., 1974. Elaeagnus L. Pages 376-379 in Schopmeyer, C.S., tech. coord., Seeds of woody plants in the United States, USDA For. Serv., Agric. Handbk No. 450.

James, R.L., J.W. Byler, and C.J. Gilligan. 1985. Isolations from Russian olive seedlings with terminal dieback symptoms from the Big Sioux Nursery, Watertown, South Dakota, USDA Forest Service, Northern Region, Cooperative Forestry and Pest Management, November 1985, 3pp.